

Claims

1. A capsule filling machine (4) for the production of sealed capsules (C) of the type with lid (2) and body (1) containing pharmaceutical material, the machine (4) being of the type comprising a station (5) for feeding the capsule bodies (1) and lids (2); a dosing station (6) for filling a dose of the material into each capsule body (1); and a station (7) for closing the capsules (C) by placing each lid (2) over the respective body (1) so that their respective annular ends (2a, 1a) overlap; the machine (4) being characterised in that between the dosing station (6) and the closing station (7) there is at least one intermediate operating station (8) for applying a sealing substance in the vicinity of the ends (1a, 2a).
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2. The machine according to claim 1, characterised in that it comprises a handling turret (9) that causes the capsules (C) to follow a circular path (P) that brings them to the feed, dosing and closing stations (5, 6, 7), the sealing station (8) also being located on the circular path (P) of the turret (9).
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3. The machine according to claim 2, characterised in that the sealing station (8) at least comprises retaining means (10) for keeping the capsule body (1) and the lid (2) separate from each other, the retaining means (10) being positioned radially on, and protruding from, the turret (9) and operating in conjunction with means (11) for handling at least the lids (2).
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4. The machine according to claim 2 or 3, characterised in that the sealing station (8) at least comprises retaining means (10) for keeping the capsule body (1) and the lid (2) separate from each other, the retaining means (10) being positioned radially on, and protruding from, the turret (9); means (11) for handling at least the lids (2) and acting in conjunction with the retaining means (10); and means (12) for applying the sealing substance, facing the retaining means (10) and operating at the lids (2).
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5. The machine according to claim 3 or 4, characterised in that the retaining means (10) comprise two separate parallel arms (13, 14) protruding radially from the turret (9); the arms (13, 14) having respective open-ended bushes (15, 16) forming retaining
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seats, the top one (15) for holding the lid (2), and the bottom one (16) for holding the body (1).

6. The machine according to claim 4 or 5, characterised in that the handling means (11) are located in the vicinity of the retaining means (10), move vertically in both directions and are equipped with means (17) for creating a vacuum which enables them to hold the lid (2) and to rotate the lid (2) while the sealing substance is being applied so that the sealing substance is spread uniformly along the circular inside area at the end (2a) of the lid (2).

7. The machine according to one of the claims from 4 to 6, characterised in that the means (12) for applying the sealing substance comprise at least one spray nozzle (18) for spraying the sealing substance on at least one lid (2).

8. The machine according to claim 7, characterised in that the nozzle (18) is mounted on a bracket (19) inclined by an angle (α) with respect to the longitudinal axis (Z) of the lid (2).

9. The machine according to any of the foregoing claims from 1 to 8, characterised in that the closing station (7) is equipped with means (7a) for handling the capsule lids (2) and bodies (1) in such a way as to fully close them by overlapping them at the ends (1a, 2a).

10. The machine according to claim 9, characterised in that the handling means (7a) comprise a pair of hollow, cylindrical pins (50, 51) located on the sides opposite the arms (13, 14) supporting the capsule body (1) and lid (2) and equipped with vacuum generating means (17); the second means (7a) being also equipped with vertical handling means (7b) which move the ends (1a, 2a) towards each other until they overlap and close.

11. The machine according to claim 10, characterised in that at least one of the pins (50, 51) is equipped with means (7c) for rotating it about its axis as the lid (2) and body (1) overlap, thus producing a twisting movement as the two parts are joined in such a way as to spread a sealing substance over the surfaces of the two ends (1a, 2a).

12. The machine according to any of the foregoing claims from 1 to 11, characterised in that downstream of the closing station (7)

there is a station (20) for drying the sealed capsules (C) made.

13. The machine according to claim 12, characterised in that the drying station (20) also comprises a conveyor belt (21) for the capsules (C); the belt (21) having on its surface a plurality of seats (22) each designed to accommodate a single capsule (C) in such a way as to keep the capsules (C) in a stable position while the capsules (C) themselves are expelled.

14. The machine according to any of the foregoing claims from 1 to 13, characterised in that the sealing substance applied is an aqueous mixture of water and ethanol.

15. The machine according to any of the foregoing claims from 1 to 13, characterised in that the sealing substance applied is a cellulose based substance.

16. The machine according to any of the foregoing claims from 1 to 13, characterised in that the sealing substance applied is a gelatin based substance.

17. A method for producing sealed capsules (C), each defined by a body (1) coupled with a lid (2), the method at least comprising the steps of filling the capsule body (1) with a quantity or dose (3) of material and closing the capsule (C) by placing the lid (2) over the body (1) so that their respective annular ends (1a, 2a) overlap; the method being characterised in that it further comprises a step of applying a sealing substance to at least one of the overlapped ends (1a, 2a) of the capsule body (1) and lid (2), said sealing step being performed before the capsule (C) is closed.

18. The method according to claim 17, characterised in that the step of applying the sealing substance is performed at substantially the same time as the lid (2) partially overlaps the respective body (1).

19. The method according to claim 17 or 18, characterised in that the step of applying the sealing substance is performed while the capsule body (1) and lid (2) are held securely apart.

20. The method according to any of the foregoing claims from 17 to 19, characterised in that the step of applying the sealing substance is performed while rotating at least the lid (2) about its longitudinal axis (Z) in such a way as to apply the sealing

substance to the annular end (2a) of the inside surface of the lid (2).

21. The method according to any of the foregoing claims from 17 to 20, characterised in that the step of applying the sealing substance is accomplished by spraying.

22. The method according to any of the foregoing claims from 17 to 21, characterised in that the sealing substance comprises an aqueous mixture comprising at least water and ethanol.

23. The method according to any of the foregoing claims from 17 to 21, characterised in that the sealing substance comprises a cellulose based liquid substance.

24. The method according to any of the foregoing claims from 17 to 21, characterised in that the sealing substance comprises a gelatin based liquid substance.

25. The method according to any of the foregoing claims from 17 to 24, characterised in that the step of closing the capsule (C) is followed by a step of drying the sealed capsule (C) while the latter is held in a stable position.